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PRACTICE PATTERNS AND EARNINGS OF WOMEN PHYSICIANS

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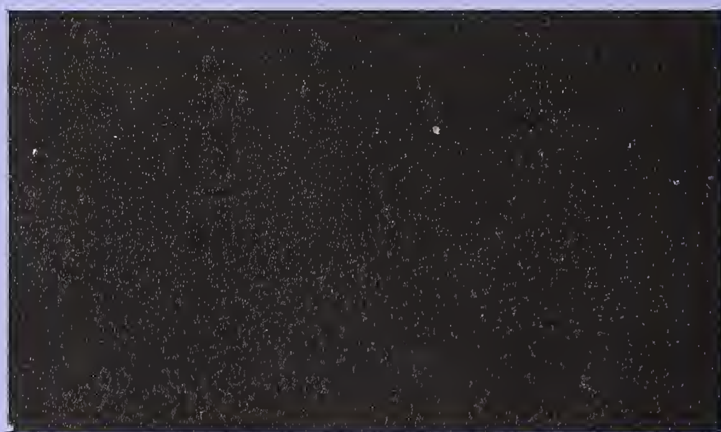

PRACTICE PATTERNS AND EARNINGS

OF

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by

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ABSTRACT

Using HCFA/NORC national survey data on 4,510 men and 750 women physicians in office-based, private practice, comparisons were made of practice styles, work effort, productivity, training and credentials, fees, and incomes. Women physicians were found to earn only 78 percent of men even after adjusting for specialty choice. This gap was considerably reduced after further adjusting for womens' lower work effort, but a significant gap still remained, i.e., $24.34 per hour for women versus $29.67 for men. Almost one-half the difference in incomes can be attributed to specialty choice and superior credentials; the remaining 55 percent to either pure discrimination on the part of patients or referring male physicians or to unmeasured productivity differences.

The supply of women was found to be insensitive to higher imputed wages while that of men physicians was actually backward bending, reinforcing previous findings. Based on higher returns to specialty training for women, better access to more specialized residencies on the part of women could improve both the quality (to patients) and equity (to women physicians) of specialist training.

Finally, our results show significant reductions in work effort among married women physicians, but not men, implying subordination of careers by women where combined family incomes are high. Dramatic reductions in medical school subsidies should shift the burden of such specialized training more to the student, which in the case of married women physicians might make them (and their spouses) more reluctant to cut back on their medical activity. What impacts lower subsidies would have in the first place on women thinking of advanced medical training remains unknown.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF TABLES

Continued

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First, I would like to thank Alice Litwinowicz of the Health Care Financing Administration for encouraging me to investigate women physicians as part of this grant. Ann Larsen provided excellent programming assistance, and Linda DeMarco and Ann Lott performed their usual fine work with the manuscript typing. Finally, I would like to thank Dr. Jerry Cromwell for his advice on empirical specification, as well as his overall review and comment. Any remaining errors or omissions are, of course, mine alone.

J.B.M.

1.0 INTRODUCTION

1.1 Statement of the Problem

The last 10-15 years have witnessed a dramatic change in the role of women in medicine. Although women still constituted only 10 percent of all patient care physicians by 1979 (AMA, 1980), this represents an increase of almost two-thirds since 1967 (USDHEW, 1978). These figures underestimate long-term trends in the relative supply of women physicians, however, given the length of time required to actually produce a physician. Over the last decade, the percent of medical students who are women has almost tripled; by 1977, almost one out of every four medical students (23.8%) was female (Wunderman, 1980). Despite these dramatic gains, two major policy questions remain unanswered:

(1) What effect will the changing sexual composition have on physician supply projections?

(2) Do women physicians continue to experience sexual discrimination in the marketplace?

Forecasts of physician supply have been based almost solely on male physicians. If the practice styles of women physicians differ markedly from those of men, then supply projections may be in error. Differences in labor force participation, work effort, and productivity have all been cited as potential sources of under-estimates. Temporary or permanent withdrawal from the labor force, usually due to child-care responsibilities, has been shown to substantially shorten the working lifetimes of women physicians compared with men (Dykman and Stalnaker, 1957; Powers *et al.*, 1969). Although these studies are fairly dated, AMA statistics for 1979 also show a higher proportion of women physicians classified as inactive, 9.8 percent compared with 6.3 percent of men (AMA, 1980). For women physicians who are active, virtually every study has documented that they work fewer hours per week or per year (most recently, see Bobula, 1980). Although women tend to choose specialties (such as psychiatry) or employment arrangements (e.g., salaried practice) associated

with shorter work weeks, simple cross-tabular results may be deceiving. Sloan (1975) confirmed the reduced work effort of women physicians holding these and other factors constant, but Vahovich (1977) did not. Finally, women physicians do appear to be less productive, seeing fewer patients per hour than their male colleagues (Langwell, 1982). While it has been suggested that women physicians may be supplying a higher quality product (i.e., a longer visit), other factors may explain this apparent "inefficiency." For example, if women physicians are less likely to join group practices, they may not be able to substitute aide time for own time.

Even after adjusting for their reduced work effort, women physicians earn substantially less than their male colleagues (Bobula, 1980; Kehrer, 1976; Langwell, 1982). It has been suggested that this may be the result of discrimination, on the part of either patients or referring physicians, and historical discrimination against women in medicine has been well documented (Walsh, 1977). Although women tend to choose the lower paying specialties, such as psychiatry and pediatrics, these choices may be largely the result of traditional societal attitudes, inflexible surgical residency programs, and outright prejudice by male faculty members (Nadelson and Notman, 1972). Nevertheless, even holding constant their differential specialty distribution, employment arrangements and other factors, women physicians earn significantly less than men (Sloan, 1975). In their decomposition of the male-female physician income differential, both Kehrer and Langwell found that only 13-28 percent of the differential could be explained by the differing characteristics of the two groups. Although discrimination might explain the residual, both authors are careful to note that still other factors could be involved (such as the productivity differences noted above).

Much of the previously cited work on women physicians has been based on the annual surveys conducted by the American Medical Association. In this paper, we seek to analyze both the impact of women physicians on supply projections and the extent of discrimination against women physicians, using a different, and in some ways more detailed, physician survey.

1.2 Summary of Findings

The dramatic increase in women physicians has emphasized the need to know more about their earnings and practice patterns compared with those of male physicians. If women physicians earn less than their male colleagues, to what extent is this due to patient or male physician discrimination? If work styles differ between men and women physicians, what effect will this have on physician supply projections?

To examine these and other questions, we drew upon physician survey data that had not been previously analyzed in this light: namely, the physician surveys conducted by NORC for the Health Care Financing Administration. These surveys were limited to office-based, private practice physicians working at least 20 hours per week, yielding more comparable samples of men and women physicians than those of other surveys. Our sample sizes were also quite large: 4,510 men and 750 women physicians.

As in other studies,

- Women were more likely to specialize in pediatrics, OB-GYN, and psychiatry, and less often in surgery.

Yet, even after adjusting for these differences in specialty choice, a substantial income gap remains:

- Women physicians average only 78 percent of what their male colleagues earn, $49,438 annually versus $63,152 (in 1977 dollars);

- Women physicians do work fewer hours per week than men, about 1½ hours less on average; so that an

- Adjustment for women's reduced work effort narrows the income gap, but only in part, with women physicians earning 88 percent of what men do on an hourly basis, specialty-adjusted.

The reduced work effort of women physicians can not totally explain their lower earnings, suggesting other factors play an important role. Specifically,

- Productivity appears to be lower in their practices, with women physicians seeing fewer patients per hour than men physicians; and

- Net revenues per visit are lower for women physicians, due to both higher costs and lower gross revenues per visit.

Low office productivity among women physicians undoubtedly raises costs per visit, as fixed practice costs are spread across a smaller number of

visits. The smaller proportion of women in group practice (28% vs. 36%) also means fewer opportunities to take advantage of other scale economies, including increased use of aides and equipment sharing. Lower gross revenues apparently result from two, reinforcing, factors:

- Women in the primary care specialties report usual fees well below those charged by men (women in the medical and surgical subspecialties charge as much as their male colleagues); and

- Women physicians participate much more heavily in the low paying Medicaid program, compared with men physicians.

Less patient demand no doubt explains both their lower fees and higher Medicaid participation rates (greater supply as a factor is ruled out due to restricted work effort). While lower demand may reflect discrimination on the part of patients and referring physicians, it may be also due to fewer credentials on the part of women physicians. For example, we found that

- Women physicians are far less likely to be board-certified than their male colleagues, 47% versus 59% (holding specialty constant); and

- One out of every five women physicians was trained in a foreign medical school, compared with only 12 percent of men physicians.

Given these systematic differences in work effort, specialty choice, and credentials, we would like to know how much of the observed male-female income differential is due to these factors and how much may be due to "pure" discrimination. In order to determine this, we estimated separate net income equations for men and women physicians, and then decomposed the wage differential in various ways. Our findings show that

- Almost one half of the differential in hourly earnings ($2.34 of $5.21) is due to the specialty choices, superior credentials, and other characteristics of men physicians; while the

- Remaining 55 percent ($2.87) is unexplained by the regression equation and is generally attributed to discrimination in the market place.

While certainly large, 55 percent is still somewhat below other findings which place discrimination effects as high as 87 percent.

This discrimination component would be larger, if it were not for the fact that there appears to be a certain amount of reverse discrimination in the physicians' market. Our results imply (as have those of other studies) that

- Women physicians with similar characteristics, or practicing in similar market conditions, as men are rewarded disproportionately more. Women physicians, for example, enjoy an average return of 29 percent for evey year of residency training, compared with only 17 percent for men.

Why are these returns so much greater for female physicians? One explanation is that the average women choosing to specialize may be more talented than the average man. Historic barriers to medical school encountered by women, especially to the surgical specialties, may have been so great that only the most dedicated, the most exceptional, women have been able to overcome them. If this is true, then society, as well as the practicing female physician, has lost valuable talent and skills.

Given society's tremendous investment in medical education, we would like to know how to encourage women physicians to work harder. To determine this, we estimated separate hours-worked, or supply, equations for men and women physicians using two-stage least squares techniques. The results suggest that

- Women physicians are unresponsive to increases in hourly earnings, implying they are on the vertical portion of their supply curve; while

- The supply of men physicians is definitely backward-bending at the average imputed hourly wage.

Thus, raising fees would have no impact on the work effort of women physicians and would actually encourage men physicians to cut back their work hours.

Finally, our results suggest that household composition and responsibilities play a much more important role in the supply decision of both men and women physicians than previously thought:

- Being married significantly reduces the work effort of women physicians, but does not affect that of men; yet,

- Contrary to the conventional wisdom, childcare responsibilities do not constrain the hours worked by women physicians, and actually encourage men physicians to work harder.

These differences tell an interesting story about traditional male and female roles in this county's highest paid profession. Women physicians are usually married to other high income professionals, often other physicians, whereas the wives of men physicians earn much lower incomes, if they are working at all. In female physician households with high family incomes, it is the women physician who generally decides to reduce her medical activity, subordinating her career to her husband's. When there are children, however, <u>both</u> men and women physicians work harder to support them, rather than cutting back their hours.

<u>Conclusions and Policy Implications</u>

What are the policy implications of our findings? <u>First</u>, it appears that less of the male-female income differential can be attributed to direct discrimination than previously thought, suggesting that women physicians can narrow much of the income gap by altering specialty choices and acquiring certain credentials. Here, public policy can play a role by assuring more equal access to medical school generally and specialty residencies in particular. That women who do enter surgical specialties appear to be even more talented than the average male specialist suggests that many more talented women may have been shunted into other fields. The resulting loss to society may be tremendous.

Reductions in public subsidization of medical education will raise financial barriers to access and require new entrants to go into considerable debt. This may encourage women who actually succeed in medical school to remain full-time in the medical market after marriage to pay off incurred debts. This benefits society, of course, by forcing all physicians, women as well as men, to place a more realistic value to the high cost of their medical training.

<u>Second</u>, physician supply projections that do not take into consideration either the changing sexual composition of the stock or the inelastic (or negative elastic) responses to higher and higher earnings may underestimate future physician requirements. The Bureau of Health Professions' (BHP, 1981) physician model, for example, projects supply needs out to 1990 by forecasting population demand then adjusting the 1975 physician stock accordingly. Productivity is implicitly assumed fixed. In another volume, however, the Bureau (BHP, 1980) projects women physicians to grow as a percent of

the stock from 8.0 percent in 1974 to 16.4 percent by 1990 (BHP, Table 12). If the productivity of women physicians remains roughly 10 percent below that of men, as our results indicate, then the rapidly changing sexual composition would lower effective supply, as measured by visits, by slightly less than 1 percent, or about 3,500 physicians less by 1990.

Of much greater policy concern are our findings relating hourly earnings, and indirectly, fees to work effort. If, as others (Feldstein, 1970; Sloan, 1975, Vahovich, 1977) have already found, many physicians are unresponsive to higher fees, or what is worse, cutting back on their time as fees climb, then the traditional policy lever of offering higher reimbursements, or, what amounts to the same thing, broader insurance coverage, will not improve access and may, in fact, hinder it. The Medicare and Medicaid programs face a true dilemma here, because both compete with each other and other private insurors for scarce physician time. If they follow a policy of raising allowables, then private insurors must follow suit and perverse supply responses come into play, frustrating all groups. If, on the other hand, they hold the line on allowables, Medicare assignment and Medicaid participation rates fall as physicians substitute more lucrative private patients for those with Medicare and/or Medicaid coverage. Only a form of "all-payors" reimbursement policy, wherein all insurors, including Medicare and Medicaid, paid similar fees, could simultaneously achieve both lower public expenditures and improved access.

1.3 Overview

Chapter 2 describes the data sources used in our analysis, and compares the sample of men and women physicians. Descriptive results are presented in Chapter 3, including comparisons of incomes, work effort, credentials, gross revenues, costs, fees, geographic location, and Medicaid participation. In Chapter 4, we estimate net income equations for men and women physicians, and decompose the differentials into their component causes. Finally, econometric analysis of the differences in work effort is presented in Chapter 5.

2.0 METHODS

2.1 Data Sources

The primary data bases for this analysis are the annual physician surveys conducted by the National Opinion Research Center (NORC) for the Health Care Financing Administration (HCFA). Each survey is a nationally representative sample of office-based, private practice physicians in fifteen specialties: allergy, cardiology, dermatology, gastroenterology, general practice, general surgery, internal medicine, neurological surgery, obstetrics-gynecology (OB-GYN), ophthalmology, orthopedic surgery, otolaryngology, pediatrics, psychiatry, and urology. An extensive questionnaire was administered to all physicians by telephone. This questionnaire included data on practice costs, work effort, size and type of practice, physician income, and fees. All information was based on physician self-reports.

A stratified-element (non-clustered) sampling procedure was used in which the strata were defined by specialty, geographic region, and county group size. In order to ensure that there would be sufficient cases for some analyses, certain strata were oversampled. Allergists, for example, were sampled at a higher rate than the more prevalent internists. In order to adjust for this disproportionate allocation, "weights" have been used in all analyses reported here. These weights serve to inflate the sample physicians to the larger physician population from which they were drawn. As the degrees of freedom for significance testing would also be inflated, the weights have been "normalized" by a constant n/N where n is the actual number of sample observations and N represents the population estimates obtained with the weights.

Measurement error might be present if physicians refused to participate in the survey, or if they reported inaccurate or incomplete information. These types of errors are known as non-response bias and field bias, respectively. Extensive analysis of the 1976 survey found no evidence of measurement error (see Sloan, Cromwell, and Mitchell, 1978, pp. 14-21). The weights associated with each sample, furthermore, include adjustments for nonresponse.

A number of additional data sources were merged with the physician surveys for these analyses. Biographic information on individual survey physicians was obtained from the AMA Masterfile, including such data as physician age, board-certification, and medical school. Variables describing the physician's county, such as demographic characteristics, were drawn for the Area Resource File.

2.2 Sample Description

A major stumbling block in studies of women physicians has been inadequate sample sizes, especially for specialty-specific analyses. Three years of comparable HCFA-NORC survey data (1977-1979) were available,* and female physicians from those three surveys were pooled for analysis, yielding a total sample of 750. As each survey was a nationally representative sample of physicians, no bias was introduced by doing so. All monetary variables were inflated (or deflated as appropriate), based on the Consumer Price Index or one of its components (e.g., physician fees). Fees are expressed in 1978 dollars, incomes, costs, and revenues are in 1977 dollars. The comparison group of male physiciasn was drawn from a single survey (1978), with a total sample size of 4,510.

The HCFA-NORC surveys differ in several key respects from the AMA's Periodic Surveys of Physicians often used in other studies of women physicians. First, only office-based, private practice physicians were included, so specialties such as anesthesiology (which is particularly popular among women) are omitted. Second, group practices with more than nine fulltime physicians were excluded, such as clinic arrangements and health maintenance organizations, for example. Women physicians, however, are more likely to gravitate to the latter type of settings. Finally, survey physicians must have had the same practice during all of the preceding year and to have worked at least 20 hours per week. If women physicians are more apt to work part-time or part of the year, they will have been disproportionately excluded. Thus, our sample is not representative of all U.S. women physicians, and will not be directly comparable with findings reported from other surveys. This sample, however, has the advantage of being much more comparable with our sample of men physicians.

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*The sampling methodology used in the first HCFA-NORC survey conducted in 1976 was substantially different from that used in the subsequent surveys.

Table 1 presents the specialty distribution of our samples of male and female physicians, as well as the raw (unweighted) number of observations within each specialty. The specialty distribution (as with all tables presented in this paper) has been weighted, using the sampling weights described earlier. Compared with their male colleagues, women are disproportionately more likely to specialize in OB-GYN, pediatrics, and psychiatry. Almost one-half (47%) of the female physicians are represented in these three specialties, compared with less than one-fourth (23%) of the male physicians. Women physicians are less likely to remain in general practice or to specialize in surgery; only 12 percent have chosen general surgery or one of the surgical specialties (excluding OB-GYN), compared with 30 percent of the men.

These specialty differentials are consistent with those noted in other studies, and have been variously attributed to societal attitudes regarding the appropriate medical roles for women, inflexibility of surgical residency programs, and overt sex discrimination. Whatever the reason for these differences, it is important to adjust for them when making comparisons between male and female physicians. Incomes for women physicians may appear low, for example, because of the concentration of women in the two lowest paying specialties: pediatrics and psychiatry. Thus, when presenting means for the female sample as a whole, we provide both unadjusted and adjusted means, where the latter has been weighted by the male specialty distribution.

It can be seen from Table 1 that some of the sample sizes, especially for women in the surgical specialties, are quite small. In the analyses that follow, some statistics will be presented separately for the five most common (largest) specialties: general practice, internal medicine, OB-GYN, pediatrics, and psychiatry. The remaining specialties will be grouped as "other medical specialties" or "other surgical specialties" (including general surgery), with unweighted sample sizes of 82 and 88, respectively.

TABLE 1

SPECIALTY DISTRIBUTION AND SAMPLE SIZE BY SEX OF PHYSICIAN

	Specialty Distribution (percent distribution)		Sample Size (unweighted)	
	Male	Female	Male	Female
Allergy	0.84%	1.03%	131	35
Cardiology	2.55	1.47	117	13
Dermatology	2.32	4.47	137	27
Gastroenterology	0.86	0.38	91	7
General Practice	26.03	19.79	625	77
General Surgery	11.09	2.54	523	21
Internal Medicine	14.71	13.95	481	69
Neurosurgery	1.17	0.74	120	13
OB-GYN	9.50	12.87	581	103
Ophthalmology	6.04	3.35	192	17
Orthopedic Surgery	5.34	3.43	174	15
Otolaryngology	2.68	1.72	168	19
Pediatrics	6.38	18.65	495	180
Psychiatry	7.11	15.34	515	151
Urology	3.39	0.28	160	3
Total	100%	100%	4,510	750

3.0 DESCRIPTIVE FINDINGS

3.1 Earnings of Men and Women Physicians

Previous findings of consistently lower net incomes for women physicians are confirmed here as well. Women physicians average only 76 percent of what their male colleagues earn, $47,941 versus $63,152 (see Table 2). Adjusting female physicians' incomes for specialty differences narrows the gap but only slightly, about $1500. Other factors, besides the specialty choices of women, must explain the income gap. These net incomes have already been adjusted for geographic cost-of-living differences, so differential physician location by sex is not a factor here either. Although women in all specialties earn substantially less than men, the differential does vary considerably by specialty, ranging from 68.8 percent for women psychiatrists to 93.5 percent for women surgical specialists.

These differentials in net incomes are open to interpretation depending on the underlying source of the differential. Net incomes (Y) can be decomposed as:

$$(1) \quad Y = \left[\frac{GR}{V} - \frac{C}{V}\right] \cdot \frac{V}{MH} \cdot MH$$

where GR/V = gross revenues per visit; C/V = average cost per visit, V/MH = visits per physician hour and MH = total physician hours. Net incomes for women physicians could be lower than those of men because (a) gross revenues per visit are lower, (b) average costs are higher, (c) productivity is lower, or (d) work effort is lower.

Table 2 also presents physician net incomes adjusted for hours worked (as well as cost-of-living). The result is an imputed real wage which stands as a rough measure of the physician's economic return to labor. Adjusting for work effort generally narrows the income gap between men and women physicians; this is not surprising given previous evidence on the shorter work weeks of female physicians. As a group, women physicians earn 82 percent of what their male colleagues do per hour, or 88 percent when specialty differences are also held constant. Women GPs and internists, however, continue to earn substantially less, about 77 percent of men's hourly incomes, suggesting that women in these two specialties work as hard or harder than their male colleagues. We examine work effort directly below.

TABLE 2

NET INCOMES (AND IMPUTED HOURLY WAGES) OF MALE AND FEMALE PHYSICIANS BY SPECIALTY

	Male	Female		Differential	
		Unadj.	Adj.	Unadj.	Adj.
General Practice	$54,437	$45,019	--	0.827	--
	(24.49)	(18,81)	--	(0.768)	--
Internal Medicine	56,641	43,841	--	0.774	
	(27.02)	(20.66)	--	(0.765)	--
OB-GYN	71,503	55,261	--	0.773	--
	(31.17)	(26.21)	--	(0.841)	--
Pediatrics	52,642	41,344	--	0.785	--
	(24.30)	(20.79)	--	(0.856)	--
Psychiatry	51,782	35,629	--	0.688	--
	(28.50)	(23.98)	--	(0.841)	--
Other Medical Specialties	68,484	56,428	59,677	0.824	0.871
	(35.88)	(33.03)	(36.21)	(0.921)	(1.010)
Other Surgical Specialties	75,165	70,314	70,201	0.935	0.934
	(35.12)	(36.23)	(33.77)	(1.030)	(0.960)
All	63,152	47,941	49,438	0.759	0.783
	(29.67)	(24.34)	(26.07)	(0.820)	(0.879)

3.2 Work Effort

Although men average almost three hours more per week than women, the differential is more than halved once we adjust for specialty differences (see Table 3). Even this small difference (1.3 hours) will affect earning power over the long run, however; it amounts to 62 hours during the course of a year, or the equivalent of another week and a half in practice. (There are no real differences in weeks worked per year, probably due to the sampling definitions used.) If women physicians worked as long as men, they could increase their net annual earnings over 3 percent (assuming a constant return per hour worked).*

For the most part, women physicians work fewer hours per week regardless of specialty. The differences are most marked for women psychiatrists who work 4 hours less (36 vs. 40 for men) and women OB-GYNs who work 6 hours less (47 vs. 53). One major exception is women GPs who report working 53 hours per week, considerably more than their male colleagues (49 hours).

Comparisons of hours worked may understate the difference in work effort between men and women physicians. Even after adjusting for specialty differences, women physicians make 13.5 percent fewer visits per week than men physicians. (Total visits in Table 3 represent the sum of the five visit categories.) Average caseloads for women are lower in all of the visit categories, but disproportionally so for inpatient and other non-office visits. As these visits are apt to yield higher net revenue per hour worked, this may further contribute to the lower incomes of women physicians beyond simply smaller caseloads.

Although smaller average caseloads appear typical for all women physicians, there are some noteworthy differences by specialty, as also shown in Table 3. Women internists actually provide about the same number of visits as do their male colleagues, while women GPs (despite their greater work effort) and pediatricians provide 11-12 percent fewer. Women OB-GYNs, furthermore, see 17.4 percent fewer patients than men do, only some of which is probably

*Economists generally assume a declining wage rate with increased work effort (see Sloan, 1975). It is conceivable, however, that women physicians are still operating in the inelastic portion of their demand curves. We explore this explicitly later.

TABLE 3

WORK EFFORT AND AVERAGE CASELOADS FOR MALE AND FEMALE PHYSICIANS

	GPs		Internists		OB-GYNs		Pediatricians		Psychiatrists	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Office Visits	134.5	126.2	79.3	79.6	104.8	91.2	135.1	117.9	37.5	30.1
Inpatient Visits	38.3	33.3	47.7	46.0	40.2	31.4	27.7	25.0	12.0	4.5
Operations	1.2	1.1	0.2	0.0	7.3	5.5	0.5	0.1	--	--
ER/Clinic Visits	6.2	3.7	4.8	3.2	4.3	5.7	5.8	8.0	1.4	0.7
Nursing Home Visits	7.2	4.1	4.3	3.5	0.3	0.0	0.2	0.6	1.1	0.1
Total Visits	187.4	168.5	136.3	132.4	156.9	133.7	169.3	151.7	52.0	35.5
Total Hours	49.1	53.1	47.8	46.3	52.8	46.9	47.8	45.7	40.5	36.2
Weeks Worked	47.7	48.6	47.4	47.8	46.9	47.2	47.6	47.3	47.3	46.6

TABLE 3 cont.

WORK EFFORT AND AVERAGE CASELOADS FOR MALE AND FEMALE PHYSICIANS

	Medical Specialists			Surgical Specialists			All		
	Male	Female		Male	Female		Male	Female	
		unadj.	adj.		unadj.	adj.		unadj.	adj.
Office Visits	107.7	103.4	81.2	81.1	80.5	73.6	99.1	91.8	91.2
Inpatient Visits	31.3	16.8	29.1	49.3	35.2	39.3	40.1	27.8	33.9
Operations	1.8	1.1	1.2	6.9	5.0	6.1	3.2	1.6	2.7
ER/Clinic Visits	4.7	1.7	2.1	6.8	4.8	5.2	5.5	4.3	4.2
Nursing Home Visits	0.9	0.7	0.7	0.7	0.7	0.9	2.9	1.6	1.9
Total Visits	146.5	124.5	114.3	144.6	126.2	125.1	150.8	127.1	132.9
Total Hours	43.8	40.5	41.3	49.0	44.0	45.7	48.2	45.4	46.9
Weeks Worked	46.9	46.6	46.8	46.9	46.7	47.1	47.3	47.4	47.6

attributable to their shorter work week. Although they see fewer patients in almost every setting, the differences are relatively greater in the hospital; women OB-GYNs, for whatever reason, appear to be performing less surgery. How can we account for these differences? There is no reason to believe that women physicians treat less seriously ill patients. Other possible explanations include greater preferences for leisure, lack of hospital admitting privileges, and low patient demand. We explore all of these in later sections.

The fact that the male-female differential in caseloads is so much greater than for hours worked suggests there may be productivity differences as well. To explore this, we calculated a crude productivity measure: the number of office visits per hour spent seeing patients in the office. Through-put in women's office practices is definitely constrained, about 22 percent lower, compared to that of men (see Table 4). Every two hours, the male physician has treated one more office patient than has his female counterpart (3.15-2.59 = 0.56 patients per hour). The productivity differential varies considerably by specialty, from only 10 percent for other surgical specialists to a striking 49 percent for psychiatrists.

Are women physicians really less efficient or are there other factors not taken into account here? Langwell (1982) has pointed out that fewer patients per hour implies longer visits, and suggested that women physicians may be providing a higher quality product. Hedonic regression work has shown that longer visits are indeed valued more highly (AMS, 1980; Cromwell, et al., 1982; Feldman, 1979); if so, the higher fees commanded by longer visits are not reflected in higher earnings for women. There are several other reasons to explain the apparent "inefficiency" of womens' practices. If women physicians are less likely to join group practices, they may be less able to substitute aide time for own time. Alternatively, low patient demand may leave women physicians with considerable down-time in the office. (Our measure of productivity, like that of Langwell's (1982), does not distinguish time actually spent with patients from other office time.)

TABLE 4

PRODUCTIVITY OF MALE AND FEMALE PHYSICIANS (OFFICE VISITS PER HOUR)

	Male	Female	
		Unadj.	Adj.
General Practice	3.85	2.99	---
Internal Medicine	2.87	2.47	---
OB-GYN	3.02	2.58	---
Pediatrics	3.57	2.96	---
Psychiatry	1.28	0.86	---
Other Medical Specialties	3.50	2.80	2.57
Other Surgical Specialties	2.98	2.76	2.65
All	3.15	2.49	2.59

3.3 Credentials and Other Characteristics

If women physicians face lower demand for their services, this could explain both their lower incomes and reduced work effort. Low patient demand could be attributed to at least three factors. First, women physicians may be disproportionately located in relatively low demand areas, e.g., poorer communities, physician-dense areas, etc. We examine geographic location later. Second, women physicians may be subject to discrimination, both by prospective patients and by referring physicians. This is much more difficult to test, although we will attempt to do so by decomposing the male-female wage differentials in Chapter 4. Third, women physicians may simply have fewer credentials. Previous studies of AMA data have shown that they are more likely than men physicians to be foreign-trained and less likely to be board-certified (Kehrer, 1976 ; Langwell, 1982; Wunderman, 1980). These studies, however, have failed to adjust for specialty differences; women physicians may tend to choose those specialties with lower rates of board-certification.

Table 5 presents board-certification rates by specialty for men and women physicians. In almost every specialty, women are substantially less likely to be board-certified compared with their male colleagues. While the majority of men internists, OB-GYNs, pediatricians, and psychiatrists have passed their specialty board exams, the majority of women in those fields have not. These differentials are so large as to raise serious questions about the comparability of the two groups even within specialty. If women physicians tend to be younger on average, then they may simply not have had time to take the board exams; several specialties, including pediatrics and psychiatry, require that the physician be in practice for several years before he/she can actually sit for the exam. As we will see later in Table 7, however, there are no age differences between men and women physicians. Another possible explanation may be that women physicians are more likely to be foreign-trained, and FMGs generally have lower rates of board-certification (Glandon and Shapiro, 1980, Table 8).

TABLE 5

BOARD-CERTIFICATION RATES FOR MALE AND FEMALE PHYSICIANS

	Male	Female	
		Unadj.	Adj.
General Practice	23.9	26.9	--
Internal Medicine	50.9	38.1	--
OB-GYN	81.8	45.3	--
Pediatrics	75.8	41.7	--
Psychiatry	55.6	31.9	--
Other Medical Specialties	77.5	69.8	62.7
Other Surgical Specialties	78.8	80.7	76.2
All	58.8	43.9	47.1

That women physicians graduate in disproportionate numbers from foreign medical schools is shown dramatically in Table 6. One out of every five women physicians is an FMG compared with only one out of every eight men. The only specialty without a substantial concentration of women FMGs is psychiatry. In OB-GYN and pediatrics, women physicians are twice as likely to be FMGs; one out of every three female OB-GYNs and pediatricians was trained abroad, usually in a Third World (non-Western European, non-English speaking) country (see Table 6B). Where do these women FMGs come from? Fully one-half (49.8%) have immigrated from just three countries: India, Pakistan, and the Philippines. (The comparable figure for men FMGs is 21.6%.) This may be one explanation for women physicians' lower incomes, as the hedonic work cited earlier has found that U.S. medical training is definitely a quality-attribute leading to higher fees. It does not fully explain lower board-certification rates for women physicians, however. While male FMGs are far less likely than male U.S. graduates to be board-certified (42% vs. 61%), there is much less difference among women; 41 percent of women FMGs are board-certified compared with 45 percent of domestic women graduates.

Other personal and practice characteristics (shown on Table 7) generally reveal fewer differences. Once specialty is held constant, there are no differences in the percent of men and women physicians who are affiliated with a hospital. Thus, lack of admitting privileges can not explain the relatively low surgical and hospital caseloads of women physicians seen in Table 3. Women psychiatrists, however, are less likely to be hospital affiliated compared with their male colleagues (56% vs. 72%). This, coupled with their low office productivity (or conversely, long office visits), suggests women psychiatrists may be treating a less seriously ill population: providing traditional psychotherapy visits to neurotic patients rather than shorter drug therapy visits to psychotic patients.

Women physicians are more likely than men to be salaried employees, but the differences are fairly slight compared with those found in AMA data (again because of our sample definitions). Women physicians are considerably less likely, on the other hand, to be in group practice, 28 percent versus 36 percent for men physicians. Given the relative scarcity of other

TABLE 6

MEDICAL TRAINING OF MALE AND FEMALE PHYSICIANS

6A. Foreign Medical Graduates (%)

	Male	Female	
		Unadj.	Adj.
General Practice	10.9	14.9	--
Internal Medicine	14.3	26.3	--
OB-GYN	13.7	33.0	--
Pediatrics	16.1	33.8	--
Psychiatry	12.0	12.9	--
Other Medical Specialties	10.6	11.0	14.9
Other Surgical Specialties	12.1	16.9	16.8
All	12.4	22.0	19.9

6B. Third World FMGs (%)

	Male	Female	
		Unadj.	Adj.
General Practice	5.8	11.4	--
Internal Medicine	8.3	18.8	--
OB-GYN	9.4	28.1	--
Pediatrics	11.9	28.8	--
Psychiatry	5.8	5.7	--
Other Medical Specialties	5.9	7.9	12.5
Other Surgical Specialties	8.1	12.1	11.3
All	7.6	16.8	14.8

TABLE 7

PRACTICE CHARACTERISTICS OF MALE AND FEMALE PHYSICIANS

	Male	Female	
		Unadj.	Adj.
Hospital Affiliated (%)	94.6	89.5	93.3
Employee (%)	2.3	4.6	3.8
Group Practice (%)	35.7	28.4	28.3
Aides per MD	1.96	1.63	1.77
Age (years)	50.6	49.4	50.3
Experience (years)	25.1	23.9	24.7

women physicians, the choice for most women physicians is constrained to solo practice or groups composed of men physicians, and it is possible that men-dominated practices may discriminate against prospective female members. Sex, however, may reflect both perceived and real differential abilities (e.g., lack of board-certification, foreign medical training), as well as pure discrimination. In any case, the higher concentration of solo practices, together with less reliance on aides, 1.77 per physician compared with 1.96 employed by men physicians, may be partial explanation of the low office productivity observed for women physicians.

Nor can lower board-certification rates for women physicians be attributed to their young age. As seen in Table 7, both men and women physicians are around 50 years of age. Similarly, both groups have been practicing medicine for about 25 years.* This contrasts with Kehrer (1976) and Langwell (1982) who found that women physicians had 3-4 fewer years of experience than men. Differences in sample definition and a failure to adjust for specialty in their studies may explain these differences.

3.4 Gross Revenues and Costs

Earlier we saw that male-female differentials in net incomes can be decomposed into gross revenues, costs, work effort, and productivity. So far, we have examined only the latter two, and have seen that both work effort and productivity are definitely lower among women physicians. Incomes of women physicians may also be lower if gross revenues are lower or practice costs are higher. Langwell (1982) found no systematic differences in the ratio of professional expenses to gross income between men and women physicians; this ratio was higher for women physicians in some specialties, but lower in others. These ratios were not adjusted for geographic cost-of-living differences, however, which may explain at least some of the male-female differentials.

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*Our experience variable is defined as the number of years since medical school graduation and does not adjust for time spent outside the practice of medicine. This is a particular problem for women physicians, as they may disrupt their careers to raise a family. Kehrer and Langwell were both able to adjust their measures for actual, rather than potential, experience; this adjustment however, reduces women physicians' experience by less than a year and a half on average.

In Table 8, we present gross revenues, costs, and net revenues (or markups), adjusted for COL differences and expressed on a per visit basis. As seen in Table 8, net revenues per visit are higher only for women psychiatrists and medical specialists. All other women physicians derive considerably lower net revenues per visit, about 16 percent lower on average overall, i.e., \$12.48 vs. \$14.52. For the four primary care specialties, markups are even lower for women physicians, as much as 41 percent lower in the case of OB-GYNs, i.e., \$10.75 vs. \$15.15.

Why are net revenues so much lower for women physicians? We see in Table 8 that it is both because gross revenues per visit are lower and costs per visit are higher. Low office productivity among women physicians undoubtedly raises costs per visit, as (presumably) fixed practice costs are allocated across a smaller number of visits. The small proportion of women in group practice also means that they can not take advantage of other scale economies. Nevertheless, even if women physicians were able to lower unit costs by running their practices more efficiently, markups would remain below those of men because of lower gross revenues per visit.

Gross revenues per visit include the fee received for the visit itself plus any additional reimbursement for ancillary services. Our survey data included fees only for visits, but male-female differentials in these fees should be representative of all fees.* Table 9 presents usual fees for follow-up office and hospital visits by specialty for men and women physicians. Specialty-specific fees are provided for psychiatrists. While women medical and surgical specialists charge fees as high or higher than those of their male peers, other women physicians, especially those in primary care, report fees well below those of men.** Less patient demand must explain these low usual fees (greater supply is ruled out due to restricted work effort), lower not necessarily because of discrimination (for highly specialized women do as well as men) but because of inferior credentials. Women physicians, especially in primary care, are far less likely to be board-certified or to have graduated from U.S. medical schools.

*Gross revenues could be lower if women physicians simply ordered fewer ancillaries. There were no differences, however, in the percent of visits for which men and women physicians ordered lab tests, x-rays, injections, or office surgery.

**Langwell found that women physicians charged higher fees than men in every specialty but psychiatry. Again, geographic cost-of-living differences may totally explain her findings. Higher fees of women is also inconsistent with hedonic price research (see AMS, 1980).

TABLE 8

REVENUES AND COSTS PER VISIT BY SPECIALTY FOR MALE AND FEMALE PHYSICIANS

	Male	Female	
		Unadj.	Adj.
General Practice			
GR/V	$15.01	$13.28	- -
C/V	6.23	6.74	- -
NETR/V	8.78	6.54	- -
Internal Medicine			
GR/V	20.02	17.86	- -
C/V	8.06	9.05	- -
NETR/V	11.96	8.80	- -
OB-GYN			
GR/V	23.85	18.66	- -
C/V	8.70	7.92	- -
NETR/V	15.15	10.75	- -
Pediatrics			
GR/V	14.29	13.48	- -
C/V	6.23	7.07	- -
NETR/V	8.05	6.41	- -
Psychiatry			
GR/V	41.07	43.21	- -
C/V	9.35	11.37	- -
NETR/V	31.71	31.84	- -
Other Medical			
GR/V	24.53	24.77	27.87
C/V	9.26	9.45	10.47
NETR/V	15.27	15.32	17.40
Other Surgical			
GR/V	27.77	25.72	26.30
C/V	10.08	10.91	10.66
NETR/V	17.69	14.81	15.64
All			
GR/V	22.81	21.59	21.43
C/V	8.30	8.69	8.95
NETR/V	14.52	12.90	12.48

KEY:
GR/V = gross revenues per visits
C/V = costs per visit
NETR/V = net revenues (mark-ups) per visit.

TABLE 9

USUAL FEES FOR MALE AND FEMALE PHYSICIANS

	Male	Female	
		Unadj.	Adj.
Follow-up Office Visit			
General Practice	$13.24	$11.75	--
Internal Medicine	17.82	16.47	--
OB-GYN	18.29	17.09	--
Pediatrics	13.06	12.56	--
Other Medical Specialties	18.15	17.18	$18.41
Other Surgical Specialties	16.36	17.94	18.22
All	15.83	14.87	15.68
Follow-up Hospital Visit			
General Practice	16.39	17.13	--
Internal Medicine	20.48	19.92	--
OB-GYN	18.31	19.53	--
Pediatrics	18.01	16.10	--
Other Medical Specialties	21.41	18.20	19.73
Other Surgical Specialties	18.39	18.30	18.67
All	18.36	17.99	18.43
Psychiatry Visits			
30 min. therapy session	31.66	29.74	--
45-50 min. therapy session	51.99	49.89	--

Usual fees are the list prices maintained by physicians and may not represent actual transactions prices. Transactions prices may be lower than list prices due to bad debts or third-party fee reductions. No differences were found in the percent of patients that men and women physicians report are uninsured, which suggest no bad debt effect. Third-party fee reductions, on the other hand, could differ if women physicians are more likely to participate in low paying public programs such as Medicaid. With the exception of psychiatrists, women physicians are much more likely to participate in Medicaid than are their male colleagues (see Table 10). The average woman physician devotes 14.2 percent of her caseload to Medicaid patients, compared with 10.5 percent for the average male physician.

Why do women physicians participate so much more heavily in Medicaid? There are at least three plausible explanations. First, women physicians may simply be more charitable; we know, for example, that they are politically more liberal, more likely to view health care as a right (Cromwell and Schurman, 1982). Second, because of discrimination by either patients or referring physicians, women physicians may be forced out of the more lucrative, private market into the secondary public market. Third, sex of the physician in these tabular results may be confounded with other variables such as FMG status which we know influences participation. The latter appears to be the most likely explanation. Except for pediatricians, there is no evidence that women physicians have higher Medicaid participation rates than men, once credentials, market conditions, and other factors are held constant.*

3.5 The Case of U.S. Medical Graduates

Earlier, we saw that a surprisingly large proportion (22%) of women physicians were FMGs. If FMGs differ systematically from U.S. medical graduates in income, credentials and work effort, then this might explain much of the observed male-female differential. In order to determine whether this might in fact be the case, we compared some key characteristics for

*See Mitchell and Schurman (1982) for data on pediatricians, general surgeons, and OB-GYNs, and Mitchell, Cromwell, Schurman (1981) for evidence on medical and surgical subspecialists, and psychiatrists.

TABLE 10

MEDICAID PARTICIPATION RATES FOR MALE AND FEMALE PHYSICIANS

	Male	Female	
		Unadj.	Adj.
General Practice	12.0%	15.1%	--
Internal Medicine	10.8	15.7	--
OB-GYN	8.1	10.3	--
Pediatrics	12.8	22.8	--
Psychiatry	8.4	7.3	--
Other Medical Specialties	7.7	11.3	10.6
Other Surgical Specialties	10.5	14.0	14.7
All	10.5	14.4	14.2

male and female U.S. medical graduates. As seen in Table 11, this does not change any of our basic findings. Compared with their male peers, for example, women U.S. medical graduates report lower incomes, work fewer hours, see fewer patients per hour, and are far less likely to be board-certified.

These differences among men and women U.S. graduates may be due to still other differences in medical training. It is possible, for example, that because of discriminatory admission procedures, women physicians have attended different, say less prestigious, medical schools. Sherman and McShane (1978) have developed a four-group classification of medical schools.* The four groups represent a continuum ranging from those with the strongest emphasis on primary care practice and with the lowest test scores for its students (Group 1) to those with the strongest emphasis on research and with the highest test scores (Group 4). Group 4 medical schools are those considered most prestigious by the traditional medical community, e.g., Duke, Harvard, and UCLA. Group 1 schools, on the other hand, tend to be lesser known private schools (e.g., Creighton, Bowman Gray) or public schools in more rural states (e.g., University of Nebraska, University of Arkansas). Group 2 and 3 are less distinguishable from each other, except that Group 3 is more research oriented.

Table 12 presents the distribution of U.S. trained men and women physicians across the four groups. Although somewhat fewer women have graduated from the prestigious Group 4 schools compared with men (after adjusting for specialty), the differences are not substantial. If discriminatory admission policies do (or did) exist, they are not reflected in a marked concentration of women physicians in the least prestigious medical schools.

3.6 Geographic Location

Previous work with AMA data has shown a disproportionate concentration of women physicians in our largest cities. (See, for example, Bobula, 1980, who reports 64% of women physicians practice in large metropolitan areas,

*We exclude a fifth group, foreign medical schools, here because we already know the unequal distribution of men and women physicians from those schools.

TABLE 11

EARNINGS AND PRACTICE PATTERNS OF MALE AND FEMALE PHYSICIANS: U.S. MEDICAL GRADUATES ONLY

	Male	Female	
		Unadj.	Adj.
Net Incomes ($)	64,294	49,871	55,236
Hourly Wages ($)	30.23	24.67	25.72
Total Hours	48.1	46.3	47.8
Total Visits	153.0	130.0	127.5
Productivity (office visits/hour)	3.18	2.55	2.53
Board-Certified (%)	61.2	44.9	49.7
Employee (%)	2.2	4.3	3.7
Age (years)	50.9	50.3	51.1
Experience (years)	25.4	24.4	25.2
Group Practice (%)	37.0	27.0	28.8
Medicaid Participation (%)	10.1	12.8	13.1

TABLE 12

TYPE OF MEDICAL SCHOOL ATTENDED BY MALE AND FEMALE PHYSICIANS: U.S. MEDICAL GRADUATES ONLY[a]

		Men	Women	
			Unadj.	Adj.
Primary Care Emphasis	1	32.5%	30.7%	34.6%
	2	33.6	26.8	26.1
	3	18.9	26.5	27.5
Research Emphasis	4	15.1	16.1	11.8

[a]Columns may not total 100% due to rounding.

versus only 48% of men physicians). In part this may be simply due to specialty choice, as physicians in psychiatry and in the hospital-based specialties generally tend to settle in urban areas. Table 13 presents the distribution of men and women physicians by specialty across large SMSAs (defined as 1.5 million population or more), small SMSAs, and non-SMSAs. Women physicians appear to locate somewhat more often in large SMSAs and less often in rural areas, but except for OB-GYNs, the differences are not marked. Certainly in no instances do we observe the large differences found in the AMA data, probably due to sample differences; our physician surveys excluded hospital-based specialties and any other physicians not practicing in a private office.

Table 14 presents the distribution of men and women physicians across the four census regions. The underrepresentation of women among Western physicians and the over-representation in the South is somewhat surprising. These differences are particularly marked for GPs, OB-GYNs, psychiatrists, and other medical specialists. We might have expected to find a relatively larger number of women physicians in the more liberal parts of the country, in the North East and West. Variations in location of residency training may explain some of these male-female differentials.

TABLE 13

PERCENTAGE DISTRIBUTION OF MALE AND FEMALE PHYSICIANS BY SMSA SIZE[a]

	Large SMSA		Small SMSA		Non-SMSA	
	Male	Female	Male	Female	Male	Female
General Practice	29.2%	29.1%	36.2%	32.6%	34.5%	38.3%
Internal Medicine	50.6	50.8	37.5	39.5	11.9	9.6
OB-GYN	45.1	53.5	42.3	39.4	12.7	7.1
Pediatrics	46.3	41.8	40.6	45.4	13.1	12.8
Psychiatry	61.5	66.1	31.3	27.7	7.2	6.2
Other Medical	50.7	40.5 (46.2)	42.1	49.5 (46.4)	7.2	9.9 (7.4)
Other Surgical	39.8	43.3 (46.1)	42.9	40.0 (37.2)	17.3	16.6 (16.7)
All	41.8	45.9 (44.3)	39.3	38.2 (36.8)	18.9	15.9 (18.8)

[a]Rows sum to 100% by sex of physician. Numbers in parentheses have been adjusted by the male physician specialty distribution.

TABLE 14

PERCENTAGE DISTRIBUTION OF MALE AND FEMALE PHYSICIANS BY GEOGRAPHIC REGION[a]

	North East		North Central		South		West	
	Male	Female	Male	Female	Male	Female	Male	Female
General Practice	20.8%	15.4%	25.9%	33.1%	33.2%	41.0%	20.1%	10.6%
Internal Medicine	36.2	24.8	18.3	32.7	25.9	23.53	19.6	19.0
OB-GYN	26.7	30.3	21.3	25.3	33.3	35.3	18.7	9.1
Pediatrics	30.0	33.1	19.6	25.2	34.0	24.8	16.4	16.9
Psychiatry	34.1	38.4	17.4	14.4	25.5	32.9	23.0	14.3
Other Medical	31.6	20.9 (25.4)	17.3	12.0 (13.7)	28.1	54.7 (45.5)	23.0	12.4 (15.4)
Other Surgical	24.9	32.2 (31.7)	22.3	14.6 (13.3)	31.1	31.4 (33.4)	20.6	21.8 (21.6)
All	27.4	27.9 (26.5)	21.7	23.9 (23.3)	30.7	33.4 (34.3)	20.2	14.8 (15.9)

[a]Rows sum to 100% by sex of physician. Numbers in parantheses have been adjusted by the male physician specialty distribution.

4.0 ECONOMETRIC ANALYSIS OF MALE-FEMALE INCOME DIFFERENCES

4.1 Decomposition of the Income Differential

In the descriptive findings, we have seen that women physicians differ from men in ways that influence earnings: work effort, specialty choice, credentials, etc. What we don't know is the relative magnitude of these causal factors. For example: how much of the male-female differential is due to the superior qualifications of men physicians? How much of the differential is attributable to differences in characteristics between men and women physicians, and how much to other factors such as discrimination? To answer these questions, we estimated separate net income equations for men and women physicians and then decomposed the wage differentials into their component causes, a technique used by Blinder (1973) and Oaxaca (1973) to study male-female differentials in the labor market generally, and by Kehrer (1976) and Langwell (1982) specifically for physicians. This technique is summarized briefly below.

If incomes (Y) are a function of some set of X_i characteristics, then we estimate the following equation for both group of physicians:

$$Y^M = \beta_o^M + \sum_{i=1}^{n} \beta_i^M X_i^M + u^M$$

$$Y^F = \beta_o^F + \sum_{i=1}^{n} \beta_i^F X_i^F + u^F$$

where the M and F superscripts indicate male and female physicians respectively. The total differential, R, is equal to $Y^M - Y^F$ and can be decomposed as follows:

R = raw, or total, differential

$$= \beta_o^M + \sum_i \beta_i^M \bar{X}_i^M - \left(\beta_o^F + \sum_i \beta_i^F \bar{X}_i^F\right) = E + C + U$$

where E = portion of differential due to differing endowments (characteristics)

$$= \sum_i \beta_i^M \cdot \left(\bar{X}_i^M - \bar{X}_i^F\right)$$

$$C = \text{portion of differential due to differing coefficients} = \sum_i \bar{X}^F \cdot \left(\beta_i^M - \beta_i^F\right)$$

$$U = \text{unexplained portion of differential} = \beta_o^M - \beta_o^F ,$$

and $$D = \text{portion of differential due to discrimination} = C + U.$$

The difference between the two constant terms (U), or the unexplained portion of the differential in incomes, is generally attributed to discrimination. But as Blinder (1973) notes, the explained portion of the differential $\left(\sum_i \beta_i^M X_i^M - \sum_i \beta_i^F X_i^F\right)$ can be further decomposed into:

(1) <u>the portion due to differences in characteristics</u> (E): for example, what portion of the income differential is due to male physicians entering higher paying specialties, such as surgery?

(2) <u>that portion due to differences in coefficients</u> (C): what portion of the differential is due to the fact that even when women do enter surgery, the returns are lower? In this sense the coefficients reflect differential returns to acquired characteristics.

Coefficient differences are also generally considered to reflect discrimination, although if any $\beta^F > \beta^M$, it could indicate a form of reverse discrimination or superior quality among women.

4.2 Empirical Specification and Estimation

Let the general income function be written as

$$(1) \qquad Y = A \cdot \prod_j (X_j)^{\alpha_j} \cdot H^{\beta} \cdot E$$

where Y = annual income, X = vector of earnings characteristics, H = annual hours (or average hours per week times weeks worked per year), E = random error term, and A, α_j, and β = parameters. Eq. (1) can be estimated directly using OLS methods by taking natural logs of both sides:

$$(2) \qquad \ln Y = \ln A + \sum_j \alpha_j \cdot \ln X_j + \beta \cdot \ln H + \ln E$$

The α_j are elasticities and can be interpreted as percent changes in income given percent differences in characteristics, holding work effort, H, constant.

The β coefficient also is an elasticity reflecting returns to work effort. For salaried employees, β is usually equal to one, but for self-employed physicians we expect $\beta<1$ because physicians (a) incur falling marginal revenues with a downward-sloping demand curve as monopolist competitors, and (b) experience declining marginal productivity working longer hours.

If we divide eq. (1) by H, we have an hourly earnings function of the form:

$$(3) \quad \frac{Y}{H} = A \cdot \prod_j (X_j)^{\alpha_j} \cdot H^{(\beta-1)} \cdot E.$$

Where $\beta=1$, we have constant returns to work effort, H drops out of the equation, and eq. (3) can be estimated ignoring effects (a) and (b) just mentioned. This is what, in fact, we do, saving explanation of work effort for the last chapter. However, because $\hat{\beta}$ is found to be less than 1, dropping H from the hourly earnings equation results in a more complicated interpretation of the α_j, or returns to characteristics. Where these characteristics are correlated with work effort, as with psychiatrists, employed physicians, and all physicians practicing in physician-dense areas, then the α_j reflect both the pure earnings effect plus the work effort effect; and will differ from the α_j estimated from the annual income equation. In general, negative correlations of the X_j and H variables will result in positive bias in the $\hat{\alpha}_j$ estimated from the equation where β is restricted to be equal to 1; or in other words, when eq. (3) is estimated without H. A dummy coefficient for employed physicians, for example, should be greater, in absolute value, in eq. (2) the annual income equation, than in the restricted hourly equation assuming they work fewer hours and this raises somewhat their marginal value product.

The income equations were based on the traditional human capital investment model, with the dependent variables specified as the natural log of hourly net income (WAGE) and as the natural log of annual net income (NETY). Incomes are adjusted for geographic cost-of-living differences and expressed in 1977 dollars. The first specification (WAGE) is directly comparable with that of Kehrer and Langwell. Variable means and definitions are presented in Table 15. An F test for the homogeneity of regressions rejected the null hypothesis that there were no differences in the wage

TABLE 15

VARIABLE MEANS AND DEFINITIONS

Name	Definition	Means: Male	Means: Female[a]
LN(WAGE)	natural logarithm of imputed net hourly wage	3.2553	3.0343
LN(NETY)	natural logarithm of annual net income	10.9323	10.6325
LN(HRS*WKS)	natural logarithm of annual hours worked	7.6770	7.5982
EXP	number of years since medical school graduation	25.0692	23.7042
EXPSQ	EXP squared	756.4005	684.0174
IM	physician is internist	0.1471	0.1346
OB	physician is OB-GYN	0.0950	0.1295
PED	physician is pediatrician	0.0638	0.1876
PSYCH	physician is psychiatrist	0.0711	0.1518
MED	physician is other medical specialist	0.0657	0.0742
SURG	physician is other surgical specialist	0.2970	0.1220
BOARD	physician is board-certified	0.5876	0.4390
FMG	physician is foreign medical graduate	0.1241	0.2209
EMPLOYEE	physician is salaried employee	0.0230	0.0467
LN(Y)	natural logarithm of per capita income in physician's county	8.8574	8.7430
LN(MDPOP)	natural logarithm, physicians per 1,000 county population	0.4332	0.4696

TABLE 15 cont'd.

VARIABLE MEANS AND DEFINITIONS

Name	Definition	Means Male	Means Female[a]
LN(RESID)	natural logarithm, number of years of residency training	1.0119	1.0358
EXPT	years since medical school graduation, minus residency training (EXP-RESID)	21.8504	20.5395
EXPTSQ	EXPT squared	611.0529	550.3128
HRS	patient care hours worked in last week	48.1846	43.8151
WKS	number of weeks worked in last year	47.2384	47.0522
$\hat{\text{WAGE}}$	predicted net hourly (weekly) wage	29.6442 (1341.06)	24.9386 (1022.76)
$\hat{\text{WAGESQ}}$	$\hat{\text{WAGE}}$ squared	908.3807 (1,885,884)	648.5419 (1,135,056)
AGE	physicians' age	50.6208	51.3031
AGESQ	AGE squared	2,690.3372	2,772.6543
NONPRACY	physician has nonpractice income $\geq$ \$10,000	0.1747	0.1908
GROUP	physician practices in a group	0.3555	0.2946
MARRIED	physician is married	0.9258	0.7140
KIDS	physician has at least 1 child under 18	0.5753	0.4974

[a]Means for all variables included in eqs. (1)-(8) are based on the total female sample (1977-1979). Means for eqs. (11) and (12) will be slightly different.

structure between men and women physicians. We then proceeded to estimate income equations separately for the two groups. All equations were estimated using ordinary least squares.

Explanatory variables can be grouped in five categories: (1) experience; (2) specialty training; (3) credentials; (4) employment type; and (5) market conditions. Physician experience is defined as the number of years since medical school graduation, and is specified as both a linear and squared term (EXP, EXSQ). Experience is expected to display the traditional inverted U-shaped relationship with earnings; more experienced physicians enjoy higher implicit wages, but earnings begin to decline as aging physicians face a drop in patient demand.

Specialty training was specified in two alternative ways. First, dummy variables were used to represent the major specialty groups. These variables measure the returns to specialty training. Because certain specialists face higher demand for their services than others, and can thus be expected to enjoy higher earnings, we have specified six specialty variables, rather than a more aggregate measure: IM, OB, PED, PSYCH, MED, and SURG for internists, OB-GYNs, pediatricians, psychiatrists, other medical, and other surgical specialists, respectively. General practitioners represent the omitted category. A more traditional measure of post-graduate education investment is the years of residency training. In an alternative specification, we substituted years of residency (in natural logs, LN(RESID)) for the specialty dummies. Data on the actual years of residency for each physician were not available; instead we proxied this with the years of training required for board-eligibility in each specialty. In those specifications including the training variable, our experience variables were re-defined to exclude time spent in residency (EXPT, EXPTSQ).

Credentials include board-certification and foreign medical training. Board-certified and U.S. trained physicians are generally perceived as providing higher quality services. Thus, we would expect them to earn higher incomes on average, *ceteris paribus*. BOARD and FMG are both dummy variables set equal to one if the physician is board-certified, or a foreign medical graduate, respectively.

One variable is included to measure employment type: whether the physician is a salaried employee. Physician employees are hypothesized to earn less than their more entrepreneurial colleagues.

Incomes will also vary with market characteristics of the physician's practice area. Two variables are included here: per capita income in the physician's county (LN(Y)) and the physician-population ratio (LN(MDPOP)), both specified in natural logs. Physician earnings will be higher in areas of high private demand (higher per capita incomes) and less physician competition (lower physician-population ratios).

4.3 Empirical Results

Eight regression equations are shown in Tables 16 and 17. Table 16 presents hourly net income and annual net income equations for both men and women physicians, with the specialty dummies used to capture returns to specialty training. Eqs. (1) and (3) are most directly comparable with the work done by Kehrer and Langwell. Unless otherwise noted, our discussion will focus on this specification. Table 17 presents similar regressions to Table 16, but with years of residency substituted for specialty.

The results are generally similar across all specifications, with almost all of the variables statistically significant in the hypothesized directions. The R-squares in eqs. (1) and (3) are virtually identical to those obtained by Kehrer and higher than those reported by Langwell. Experience shows the expected inverted U-shaped relationship with earnings, with no appreciable difference between men and women physicians. Hourly earnings increase as more experienced physicians face greater demand for their skills, but then begin to fall 24-25 years after graduation, as those skills begin to attrit. Annual earnings peak slightly sooner, after 21-22 years of experience, even holding work effort constant.

Not surprisingly, specialists (with the exception of pediatricians, and psychiatrists on an annual basis) earn significantly more than GPs. What is surprising, however, is that the returns to specialty training are so much greater for women OB-GYNs, medical, and surgical specialists. Women choosing these specialties raise their earnings 37-65 percent, compared with 19-35 percent for men. Returns to internal medicine are greater for men, on the

TABLE 16

NET HOURLY WAGE AND ANNUAL INCOME REGRESSIONS FOR MALE AND FEMALE PHYSICIANS: WITH RETURNS TO SPECIALIZATION

	Male		Female	
	Wage (1)	Income (2)	Wage (3)	Income (4)
LN(HRS*WKS)	--	0.3085***	--	0.3798***
EXP	0.0187***	0.0251***	0.0180***	0.0266***
EXPSQ	-0.00039***	-0.00059***	-0.00036***	-0.00059***
IM	0.0955***	0.0912***	0.0452	0.0413
OB	0.1903***	0.2296***	0.3742***	0.3764***
PED	-0.0137	-0.0206	0.0867	0.0346
PSYCH	0.1608***	0.0396	0.2151***	0.0236
MED	0.3479***	0.2758**	0.5479***	0.3932***
SURG	0.3075***	0.3016***	0.6466***	0.5576***
BOARD	0.1043***	0.1094***	-0.0184	0.0038
FMG	-0.1557***	-0.1562***	-0.0538	-0.1587***
EMPLOYEE	-0.0181	-0.0730*	-0.1236	-0.2584***
LN(Y)	0.2471***	0.2990***	0.3876***	0.3555***
LN(MDPOP)	-0.0926***	-0.1600***	-0.0283	-0.1125***
Constant	0.7345	5.6120***	-0.7212	4.3454***
R^2(c)	0.13	0.28	0.17	0.32
F (df)	52.75*** (13,4496)	125.67*** (14,4495)	12.34*** (13,726)	25.76*** (14,725)

***Significant at the one percent level.
**Significant at the five percent level.
*Significant at the ten percent level.

TABLE 17

NET HOURLY WAGE AND ANNUAL INCOME REGRESSIONS FOR MALE AND FEMALE PHYSICIANS: WITH RETURNS TO RESIDENCY TRAINING

	Male		Female	
	Wage (5)	Income (6)	Wage (7)	Income (8)
LN(HRS*WKS)	--	0.3190***	--	0.4100***
EXPT	0.0143***	0.0197***	0.0120*	0.0170***
EXPTSQ	-0.00034***	-0.00054***	-0.00026**	-0.00045***
LN(RESID)	0.1714***	0.1522***	0.2877***	0.2163***
BOARD	0.1129***	0.1242***	0.0679*	0.0940**
FMG	-0.1622***	-0.1581***	-0.0911*	-0.1688***
EMPLOYEE	-0.0371	-0.0852*	-0.1122	-0.2032**
LN(Y)	0.2403***	0.2919***	0.3514***	0.3351***
LN(MDPOP)	-0.1019***	-0.1757***	-0.0672*	-0.1604***
Constant	0.8512*	5.6698***	-0.4085	4.3406***
R^2 (c)	0.11	0.25	0.09	0.24
F (df)	68.96*** (8,4501)	171.27*** (9,4500)	10.31*** (8,731)	26.35*** (7,730)

***Significant at the one percent level.
**Significant at the five percent level.
*Significant at the ten percent level.

other hand, although the absolute differences are fairly small. There are no differences between men and women in the returns to specializing in pediatrics or psychiatry. Kehrer and Langwell also found some evidence of higher specialty returns for women, but their results are not directly comparable to ours, as they used more aggregated measures of specialty (e.g., combining internal medicine and pediatrics with all other medical specialties).

These increased returns to specialty training for women are also reflected in the RESID variable. The returns to years of training per se, averaging across specialties, are presented in Table 17. Women physicians enjoy an average return of 29 percent for every year spent in residency, compared with only 17 percent for men (eqs. 5 and 7). Why are these returns so much greater for female physicians? One explanation, noted by Kehrer among others, is that the average woman choosing to specialize may be more talented than the average man. Historic barriers to access by women, especially to the surgical specialties, may have been so great that only the most dedicated, the most exceptional, women have been able to overcome them. It must also be kept in mind, however, that these returns are all relative to GPs of the same sex, and women physicians are starting from a smaller earnings base. The coefficients associated with the LN(RESID) variable in Table 17 imply that one year of residency training would raise male physicians' earnings by $4.30 a hour, and female physicians' earnings by $5.41. Although certainly a larger dollar amount, the latter is not sufficient to close the earnings gap.

Contrary to the training results, board-certification yields a 10 percent return for men physicians, but has no net effect on the earnings of women physicians (Table 16). This contrasts with Kehrer and Langwell who found uniformly positive returns. Board-certification is correlated with specialty type, however, and these other two studies used a cruder measure of specialty differences. When we substitute years of training for the specialty dummies (see Table 17), the CERTIF coefficient turns positive and significant in the female physician equation. Even so, the returns to board-certification remain considerably smaller for women than for men specialists.

Foreign medical training uniformly depresses earnings, although the FMG coefficient in the female earnings function does not attain statistical significance (t=1.2).* Male FMGs appear to be "penalized" somewhat more than their female counterparts on an hourly basis, but there are no differences once we adjust for work effort. FMGs of both sexes earn annual incomes about 16 percent less than domestic-trained physicians, ceteris paribus.

Salaried physicians earn as much per hour as their more entrepreneurial colleagues, the correlation with work effort biasing EMPLOYEE upwards, but they definitely earn less on an annual basis, once their shorter work weeks are held constant. The negative income differential is far greater for salaried women physicians; 20-25 percent lower, versus 7-8 percent lower for men. Possibly the employment arrangements for women in our sample are different from those for men; unfortunately we can not tell from our data.

Higher per capita incomes and greater physician density have the expected positive and negative effects on physician earnings.** In both instances, women physicians appear to benefit relatively more from favorable market conditions. A ten percent increase in per capita income, for example, would raise the imputed wage of women physicians by almost 4 percent, versus only 2.5 percent for men physicians (see eqs. 1 and 3). Similarly, in areas with relatively higher physician-population ratios (and hence greater physician competition), the earnings of women physicians either are unaffected or are affected relatively less than those of men. Although the marginal effect associated with Y remains larger for women physicians, the effects for the two groups tend to converge in the annual income equations, suggesting that work effort of men and women physicians may differ under varying market conditions.

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*The two studies of AMA data are quite puzzling in this regard. Kehrer found a strong negative impact of foreign training on earnings for men physicians and no impact for women, while Langwell found no relationship for either group of physicians. Differences in sample composition may be one explanation; their sample included specialties such as anesthesiology and radiology (not in our survey) which are among the highest paying in medicine and also are particularly attractive to FMGs (see Glandon and Shapiro, 1980, Table 10).

**Kehrer obtained similar results to ours, but Langwell failed to find a strong relationship between earnings and per capita income and actually found a significant positive effect for physician density. Unfortunately, neither of these studies adjusted the monetary variables for geographic cost-of-living differences, and thus some of the obtained relationships may be spurious.

The apparent market advantage of women physicians is surprising, as we would have expected that discrimination by patients and referring physicians would leave them more vulnerable to the vagaries of the market place. We must note, however, that while women physicians may enjoy a relative advantage in high-income, physician-dense areas, they are at a relative disadvantage in low-income, physician-scarce areas. One explanation is that these market condition measures are correlated with other omitted variables. For example, the population in high income, high MDPOP areas may be better educated, and more sophisticated, and hence more likely to accept women physicians.

Finally, working more hours (HRS*WKS) definitely pays off in higher incomes, although the marginal return per hour falls off sharply. Unlike salaried workers who receive a constant return on work effort (β=1), the marginal return for self-employed physicians is considerably lower: 0.3085. Sloan (1975) has noted that physician earnings per hour will fall as work effort increases for two reasons. First, the physician's marginal product falls over time due to fatigue, difficulty scheduling appointments, etc. Second, the physician must lower his fee as the supply of visits (and hence work hours) increases. The marginal return per hour worked for women physicians, while still considerably below one, is significantly higher than that for men. Women physicians, who work fewer hours on average, have not moved as far down along their demand curve and hence enjoy relatively greater returns to the marginal hour worked.

4.4 The Differential in Incomes Decomposed

Men and women physicians clearly enjoy differential returns on investments in specialty training and board-certification, and they fare differently under similar market conditions. What we don't know is how much these factors actually contribute to the income differential. Tables 18 and 19 decompose the male-female physician differential for hourly and annual net incomes, based on eqs. (1) and (3), and (2) and (4), respectively in Table 16. (Comparable decompositions of the differential based on the equations in Table 17 can be found in the Appendix.) The first column in Tables 18 and 19 presents the total differential in incomes due to a given factor, say experience. The second and third columns decompose this further into the amount attributable to different endowments (characteristics) of the two groups, and the amount

TABLE 18

DECOMPOSITION OF THE MALE-FEMALE PHYSICIAN DIFFERENTIAL IN HOURLY NET INCOMES: WITH RETURNS TO SPECIALIZATION (all in logs)

Causal Factor	Differential	Amount Attributable to Endowments	Amount Attributable to Coefficients
Experience	-0.0066	-0.0027	-0.0039
Specialty	-0.0661	0.0342	-0.1003
Board-Certification	0.0694	0.0155	0.0539
FMG	-0.0074	0.0151	-0.0225
Employee	0.0053	0.0004	0.0049
Market Conditions	-1.2270	0.0316	-1.2586
Subtotal	-1.2324	E = 0.0941	C =-1.3265
Constant	U = 1.4557		
Total	R = 0.2233	D = C+U = 0.1292	

total differential net is positive. Men's Y are greater than women's. Y.

TABLE 19

DECOMPOSITION OF THE MALE-FEMALE PHYSICIAN DIFFERENTIAL IN ANNUAL NET INCOMES: WITH RETURNS TO SPECIALIZATION

Causal Factor	Differential	Amount Attributable to Endowments	Amount Attributable to Coefficients
Work Effort	-0.5175	0.0243	-0.5418
Experience	-0.0440	-0.0084	-0.0356
Specialty	-0.0172	0.0430	-0.0602
Board-Certification	0.0627	0.0163	0.0464
FMG	0.0157	0.0151	0.0006
Employee	0.0104	0.0017	0.0087
Market Conditions	-0.4763	0.0400	-0.5163
Subtotal	-0.9662	E = 0.1320	C =-1.0982
Constant	U = 1.2666		
Total	R = 0.3004	D = C+U = 0.1684	

attributable to different coefficients. Positive signs indicate an income advantage for men physicians and negative signs an advantage for women physicians. Recall that R, the raw differential in incomes, is equal to the sum of E, C, and U.

The results in Table 18 are similar to those of Kehrer; only a small portion of the male advantage in incomes is due to their superior endowments (E = 0.0941), with most of their advantage found in the constant terms (U = 1.4557). The total male advantage is almost offset however by the considerable female advantage in coefficients (C = -1.3265). Thus the discrimination component of the income differential (C+U = 0.1292) is considerably smaller than if based on the unexplained portion alone (U). If we remove the effect of discrimination from women's income structure, we would obtain an hourly net income 14 percent higher (e^{C+U} = 1.138) than their actual income of $20.79, or an additional $2.87. If women physicians also had the same endowments as men, net hourly incomes would increase an additional 9.9 percent (e^{E} = 1.099), or $2.34.*

Thus, of the total differential in male-female hourly incomes ($5.21), $2.34 (or 45%) is due to male physicians' superior characteristics and $2.87 (or 55%) to discrimination. These findings suggest that much more of the differential in incomes is due to the specialty choices, credentials, and other characteristics of men physicians than previously thought. Kehrer found that only 28 percent of the differential was due to different characteristics, for example, and Langwell 13 percent.

All evidence of discrimination against women physicians found here is based on the large difference in constant terms (U), or the unexplained portion of the regressions. We know, however, that men physicians appear to practice more efficiently, seeing more patients per hour than women physicians. Such productivity differentials (not captured in our regressions) may well "explain" a large part of U. Our measure of discrimination (D), furthermore,

*It obviously makes a difference whether women physicians' incomes are adjusted first for E or for C + U. We have chosen to present it this way so to be directly comparable with Kehrer and Langwell. If we had adjusted for male endowments, and then for discrimination, $2.06 of the income differential (or 40%) would be due to male endowments and $3.17 (60%) due to discrimination.

is based not only on U but also that portion of the income differential due to differences in the coefficients (C). But the negative sign associated with C in Table 18 implies reverse discrimination, that women physicians with similar endowments or under similar market conditions as men are rewarded disproportionately more. This result implies that, even if women retained their current coefficients and characteristics (including their less advantageous specialty distribution) but were give the same constant term as men, they would earn a net hourly income almost four times that of men ($e^C = 3.77$). This result hardly appears plausible, and instead suggests some possible estimation problems with C.*

In our study (as well as those of Kehrer and Langwell), the large estimate for C is due almost solely to the very large coefficient associated with per capita income, (accounting for most of the difference in coefficients associated with market conditions),**viz:

$$(\beta_y^M - \beta_y^F)\ \bar{X}_y^F = (0.2471 - 0.3877)*8.743 = -1.2284.$$

The standard error around β_y^F, however, is quite large, 0.11 compared with 0.05 for β_y^M, and thus it is possible that the difference between these coefficients is not nearly as great as it appears.

Aside from market conditions, specialty and board-certification are the most important factors in explaining male-female income differences (see the first column in Table 18). Although men physicians have an advantage in choosing the more lucrative specialties, this is more than offset by the greater

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*Kehrer and Langwell derived values for C, implying even more implausible incomes for women physicians. Similarly, in his study of income differentials by race, Blinder found that the difference in coefficients suggested blacks would earn 90 percent more than whites. Blinder also finds considerable variation in his income decomposition, depending on whether he estimates structural or reduced-form equations.

**Alternative specifications, such as substituting linear and squared terms for the natural log of Y, had no effect on the income decomposition. The difference in coefficients associated with Y was consistently large. While strong demand may raise physician earnings, it may also influence work effort. In our decomposition of annual net incomes, the difference in coefficients associated with market conditions is more than halved (-0.5163, see Table 19). The difference in coefficients associated with hours worked, on the other hand, is equally large and also favors women physicians (-0.5418). The result is a value for C of about the same magnitude and sign as that for the hourly wage decomposition.

returns to specialty training received by women physicians. The net effect definitely favors women physicians (0.0342 - 0.1003 = -0.0661), suggesting that the current trend of converging specialty choices by men and women (Weisman et al., 1980) will narrow the income gap even faster than supposed.

Male physicians have a decided advantage in board-certification, on the other hand; their incomes are higher on average not only because of their higher rate of certification but also because this credential appears to be valued more highly among men than women physicians.

5.0 ECONOMETRIC ANALYSIS OF DIFFERENCES IN WORK EFFORT

Because women physicians work few hours, even after specialty adjustment, forecasts of physician supply will be underestimated if the changing sexual mix is not taken into account. Furthermore, because society's investment in medical education is so great, it is important to learn how to encourage women physicians to work harder. Several researchers have estimated supply equations including a dummy variable for sex of the physician (see Sloan, 1975; Vahovich, 1977), but the only study we know that examined supply behavior for men and women physicians separately is that by Barbara Kehrer (1976). She found a few differences, most notably that men appear to respond positively, and women negatively, to higher earnings. In this section, we test the backward-bending supply hypothesis directly and estimate both hours- and weeks-worked equations for a more complete supply model.

5.1 Empirical Specification

Two dependent variables were specified: (1) hours spent in patient care activity per week; and (2) the number of weeks worked in the last year. Variable definitions and means can be found in Table 15.

Explanatory variables can be grouped in five categories: (1) wage and income; (2) personal characteristics; (3) household characteristics; (4) specialty and practice characteristics; and (5) area characteristics. $\widehat{\text{WAGE}}$ was specified as the physician's predicted net hourly (or weekly) income, based on the same income equations presented earlier. Because we were interested in explicitly testing the backward-bending supply hypothesis, the predicted wage variable was also specified in squared form ($\widehat{\text{WAGESQ}}$). If physician supply is backward-bending, then $\widehat{\text{WAGE}}$ and $\widehat{\text{WAGESQ}}$ should be positive and negative, respectively. Physicians with substantial nonemployment income have been shown to work less (Sloan, 1975); NONPRACY is a dummy variable set equal to one if the physician reported at least $10,000 in nonpractice income during the past year.

Personal characteristics include the physician's age and FMG status. Younger physicians are expected to work harder as they seek to establish themselves in practice, while older physicians should display declining work effort due to decreased patient demand and possible health problems. To capture this inverted U-shaped relationship, physician age was specified in both linear and squared form (MDAGE, MDAGESQ). FMGs have been shown to work fewer hours (Sloan, 1975), presumably because of cultural differences in work-leisure preferences.

The major reason women physicans are believed to work fewer hours than men is their household responsibilities, particularly the care of young children. Despite the very high opportunity cost of her time, the woman physician is usually considered to be more efficient in household activities, an assumption reinforced by traditional societal attitudes. The empirical evidence to date, however, is equivocal. Using 1960 census data, Sloan (1975) found that being a parent negatively affected the hours worked by women physicians but not men, but was unable to confirm these results with 1970 data. The sample of women physicians in both years was very small, however (about 101 and 64 in 1960 and 1970, respectively) and the number with children even smaller. Kehrer found that married women physicians worked significantly fewer hours than their unmarried colleagues but preschool children had no effect. Marital status had no impact on male physicians' work effort, and the children variable was not included in her male equation. Men physicians with young children, however, may conceivably work harder than nonparents, especially in an era of escalating education costs. We specified two measures of household characteristics: a dummy variable set equal to one if the physician is married, and a dummy variable if the physician has any children under 18 years of age (KIDS). Both variables are included regardless of the sex of the physician. In earlier specification, the KIDS variable was limited to pre-school children, but it was not significant in either equation.

Work effort will also vary as a function of practice organization. Because there is no financial return to marginal work effort, salaried employees are expected to work fewer hours than their entrepreneurial colleagues. In addition, physicians may select that type of employment because of stronger preferences for leisure. Similarly, a desire for more regular work hours and shared on-call responsibility leads physicians to enter group practice (Sloan, Cromwell, Mitchell, 1978). Because of such preferences, coupled with revenue-sharing arrangements that may discourage work effort, group physicians are hypothesized to work less than their solo colleagues. GRP is set equal to one if the physician practices in a group with other physicians, and zero otherwise. Because of casemix differences, some specialties will work more regular, and possibly shorter, hours than others. In addition, physicians may choose certain specialties because of income-leisure preferences. For example, psychiatrists' workloads tend to be the same week after week with few (if any) emergencies, while OB-GYNs may have to work at all hours of the day or night. The six specialty dummies used in the income regressions are included here to capture these differences.

Finally, in physician-scarce areas, physicians will need to work longer hours in order to provide services to all who need care. Thus, the physician-population ratio (MDPOP) will be negatively related with both our dependent variables.

5.2 Estimation Methods

A total of four regression equations were estimated: hours worked and weeks worked for men and women physicians separately. Since the physician's time-worked decision and his imputed wage are simultaneously determined, OLS will yield biased estimates. Instead, two-stage least squares was used, with a predicted hourly (weekly) income variable derived in the first stage included in our second-stage estimates of hours (weeks) worked.

Certain key variables (MARRIED, KIDS, NONPRACY) were not available in the 1977 survey, and as a result, the women physicians' sample is limited to the 1978-1979 survey, with an unweighted sample size of 558. There is no reason to believe that this would bias the results in any way. The male physicians' sample remained unchanged.

5.3 Empirical Results

Four regressions are shown in Table 20, presenting hours and weeks worked for men and women physicians, respectively. Many of the variables are statistically significant in the hypothesized directions, but with some noteworthy differences between male and female physicians. The R-squares in eqs. (10) and (12) are quite small compared to those in eqs. (9) and (11) due to the lack of variation in weeks worked.*

These results confirm Kehrer's finding that men and women physicians are located on different parts of their respective supply curves. Men physicians respond positively to higher net hourly incomes ($\widehat{\text{WAGE}}$), but with work effort falling after income reaches some critical level ($\widehat{\text{WAGESQ}}$).** Women physicians, on the other hand, are not responsive to increases in hourly incomes (at least within the observed range), implying that they are on the vertical portion of their supply curve. Thus, if policymakers wish to encourage women physicians to work harder, they must seek some means other than through prices.

Although raising fees would induce some men physicians to expand their work hours, the <u>net</u> supply increase would probably be negative. The coefficients associated with the two wage terms in eq. (9) imply that their critical wage level, the point at which the supply response of men physicians turns negative, is \$26.85, considerably <u>below</u> the sample mean of \$29.64. Almost one-half of men physicians in our sample (about 48 percent) earn net hourly incomes above this critical level and hence are on the backward-bending portion of their supply curves.*** Supply elasticities are fairly small, however: -0.09, for example, evaluated at the means. Thus, a 10 percent rise in hourly incomes would lead physicians to shorten their work week by only half an hour, *ceteris paribus*.

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*The coefficient of variation associated with work weeks was only 6 percent in both the male and female equations, compared with 30-32 percent for the hours worked variable.

**Weeks worked appear generally insensitive to variations in weekly earnings, although there is a slight negative response evident for male physicians.

***By contrast, Vahovich (1977) found the critical wage level to be well above the mean in his sample of primary care physicians. Nevertheless, one-third of physicians still earned hourly incomes above this level.

TABLE 20

HOURS AND WEEKS WORKED 2SLS REGRESSIONS FOR MALE AND FEMALE PHYSICIANS

	Male		Female	
	Hours (9)	Weeks (10)	Hours (11)	Weeks (12)
$\hat{WAGE}$	1.4179***	0.0013	0.3003	0.0012
$\hat{WAGESQ}$	-0.0264***	$-7.2*10^{-7}$*	0.0017	$-6.5*10^{-7}$
NONPRACY	0.5352	-0.2788**	-6.8135***	-0.4084
AGE	0.9217***	0.0195	0.4741	-0.1302
AGESQ	-0.0105***	-0.0003	-0.0064	0.0012
FMG	0.4012	-0.1956	-2.2276	-0.4981
MARRIED	0.9132	-0.4066**	-2.8335*	-0.6260**
KIDS	1.9162***	0.4378***	1.3453	0.6663**
EMPLOYEE	-3.7890***	-1.3061***	-4.6852	-0.2901
GROUP	2.6051***	-0.6994***	2.3588*	-0.8107***
IM	-1.8979**	-0.1880	-3.1798	-0.4327
OB	2.0917*	-0.3954	-2.9215	-0.7955
PED	-2.8267***	0.0057	-6.1729***	-0.7270
PSYCH	-8.3036***	-0.5753***	-14.5859***	-1.3929***
MED	-4.2861**	-0.5422**	-13.0423*	-0.5356
SURG	0.1731	-0.4697*	-6.0781	-1.4742
MDPOP	-1.5502***	-0.1549***	-0.5976	-0.1899
Constant	12.6097*	47.7332	38.1215**	51.6449***
R^2(c)	0.11	0.04	0.17	0.06
F (df)	33.49*** (17,4389)	12.10*** (17,4389)	7.99*** (17,541)	3.14*** (17,541)

***Significant at the one percent level.
**Significant at the five percent level.
*Significant at the ten percent level.

A large outside source of income definitely discourages work effort, but the impact is much larger for women physicians. Women physicians enjoying nonpractice income of at least $10,000 a year (NONPRACY) work almost seven hours less per week than do their less wealthy colleagues. Surprisingly, nonpractice income has no effect on hours worked by male physicians, although it does lead to a significant, but small, reduction in weeks worked. These results, coupled with those for $\widehat{WAGE}$, suggest that men and women physicians respond differently to the source of increases in income. Why this should be the case is uncertain, especially since we have held household responsibilities constant and since NONPRACY does not include spouse's earnings.

Physician age shows the expected inverted U-shaped relationship with hours worked, but only for male physicians. In the early stages of their careers, men physicians work longer hours, reaching a peak work week at about age 44; they then begin to reduce their work effort due to decreased demand, failing health, etc. The absence of an apparent age trend among women physicians may be due to a mix of career practice patterns in our sample. For example, the age-work patterns for some women physicians may resemble those of men, while others may show much higher levels of work effort later on in life when child care responsibilities are completed. (Our KIDS variable will not capture these historical trends, because women physicians working only part-time or opting out of the market altogether would not have been included in our sample.) A second physician characteristic, FMG status, had no effect on work effort for either men or women physicians.

Both men and women physicians respond to household responsibilities in making their supply decisions, but in somewhat different ways. Married women physicians work significantly fewer hours than their single colleagues, while marital status has no effect on work hours of men physicians. (Married physicians of both sexes work fewer weeks per year, possibly to spend vacation time with spouses.) Why do married women shorten their work weeks so dramatically (by almost 3 hours on average)? It is not because of child-care responsibilities, because these are captured by our KIDS variable. Instead, we are undoubtedly observing an income effect. The husbands of women physicians are apt to be high income professionals in their own right,

often other physicians (see Kehrer, 1976), while the wives of men physicians average much lower incomes, if they are working at all. Given their much higher family incomes, married women physicians have chosen to substitute leisure for market work.

Most surprising is the impact of young children on work effort. Women physicians with children work the same hours as their childless peers while men physicians with children actually work longer hours. (Having children increases weeks worked per year for both men and women physicians.) These findings contradict the conventional wisdom that children adversely effect the work effort of women physicians while having no effect on that of men. (It must be remembered, however, that women physicians, who may have chosen to work less than half-time or not at all because of childcare responsibilities, were not included in our sample.) Like fathers elswhere, the need to support a family drives men physicians with children to work harder.

Male physician employees work significantly less than their more entrepreneurial colleagues as expected, almost 4 hours less per week and over a week less a year, but there is no difference among women physicians. It had been hypothesized that group physicians would work less than their peers in solo practice, both because of financial arrangements that may discourage work effort and because of leisure preferences leading them to choose group practice in the first place. We see from eqs. (10) and (12) that group physicians of both sexes do work fewer weeks per year, but that they actually work significantly more hours per week (eqs. 9 and 10), holding specialty etc. constant. It may be that our GROUP variable is too crude, encompassing a variety of revenue and expense-sharing arrangements with differing incentives for work effort; even still, this does not explain such a strong, positive finding.

Specialty differences in work effort are generally consistent in both the male and female regression equations. Virtually all specialists work less than GPs, with psychiatrists not surprisingly having the shortest work weeks. Compared with GPs of the same sex, male psychiatrists work 8 fewer hours per week, and female psychiatrists 14 hours less.

Finally, in physician-sparse areas, male physicians exhibit significantly longer work hours as expected, although the elasticity associated with MDPOP is quite small: -0.09 in eq. (9). The work effort of women physicians, on the other hand, appears impervious to the relative supply of other physicians. While we have no explanation for this insignificant effect, it should be recalled that the hourly incomes of women physicians are also insensitive to physician density (see Table 16).

APPENDIX A:

DECOMPOSITION OF THE MALE-FEMALE PHYSICIAN INCOME DIFFERENTIAL: WITH RETURNS TO RESIDENCY TRAINING

TABLE A-1

DECOMPOSITION OF THE MALE-FEMALE PHYSICIAN DIFFERENTIAL IN HOURLY NET INCOMES: WITH RETURNS TO RESIDENCY TRAINING

Causal Factor	Differential	Amount Attributable to Endowments	Amount Attributable to Coefficients
Schooling	-0.1263	-0.0058	-0.1205
Experience	0.0013	-0.0019	0.0032
Board-Certification	0.0366	0.0168	0.0198
FMG	-0.000005	0.0157	-0.0157
Employee	0.0044	0.0009	0.0035
Market Conditions	-0.9563	0.0313	-0.9876
Subtotal	-1.0403	E = 0.0570	C =-1.0973
Constant	U = 1.2597		
Total	R = 0.2194	D = C+U = 0.1624	

TABLE A-2

DECOMPOSITION OF THE MALE-FEMALE PHYSICIAN DIFFERENTIAL IN ANNUAL NET INCOMES: WITH RETURNS TO RESIDENCY TRAINING

Causal Factor	Differential	Amount Attributable to Endowments	Amount Attributable to Coefficients
Work Effort	-0.6663	0.0251	-0.6914
School	-0.0716	-0.0052	-0.0664
Experience	-0.0011	-0.0070	0.0059
Board-Certification	0.0318	0.0185	0.0133
FMG	0.0177	0.0153	0.0024
Employee	0.0075	0.0020	0.0055
Market Conditions	-0.3451	0.0398	-0.3849
Subtotal	-1.0271	E = 0.0885	C =-1.1156
Constant	U = 1.3292		
Total	R = 0.3021	D = C+U = 0.2136	

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